



Transportation Research Division



Construction Report

*Three Projects Using 4.75 mm. Superpave HMA
on Route 1A, Route 2A, & Route 27*

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Transportation Research Division

Three Projects Using 4.75 mm. Superpave HMA on Route 1A, 2A, & 27; Limestone, Forkstown Twp., & New Portland

Introduction

In July & August, 2010, MaineDOT applied 4.75 mm. (5/8 inch) Superpave designed hot mix asphalt overlays in three locations. These overlay projects were on Route 1A, 2A, and 27, located in Forkstown, New Portland, and Limestone, respectively. Project ID numbers are 016814.00, 017314.00, and 016809.00. The specific lengths designated for the treatments are:

- Forkstown Twp. to TA R2 WELS, Route 2A, 5.5 miles
- New Portland to Kingfield, Route 27, 5.51 miles
- Limestone to Caswell, Route 1A, 3.79 miles

These projects were completed under the MaineDOT Regional Highway program as highway preservation projects. These three projects were unique in that the mix design specified 4.75 mm (5/8 inch) aggregate rather than 9.75 mm aggregate which is more commonly utilized. This small difference could lead to cost savings, if the change results in equivalent performance. The intent of these trial applications are to determine how the mix performs under Maine conditions.

Locations

The project locations are shown on the following map.



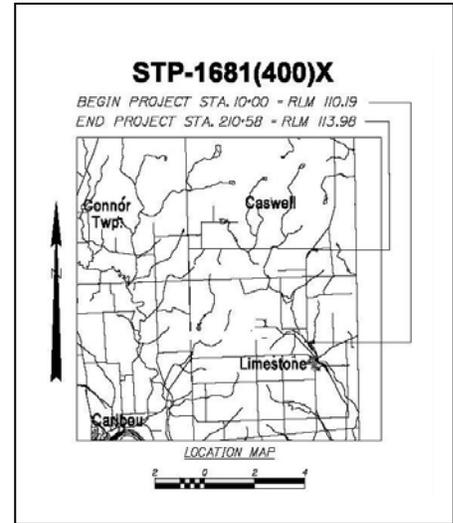
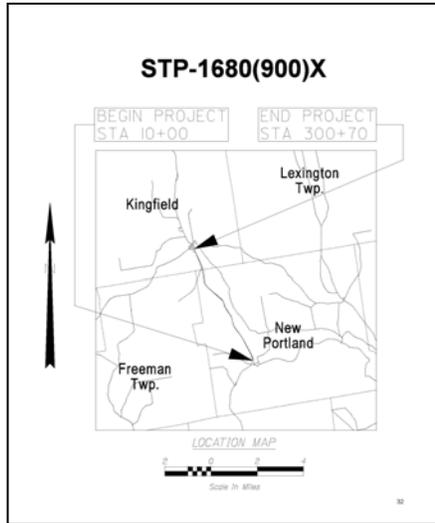
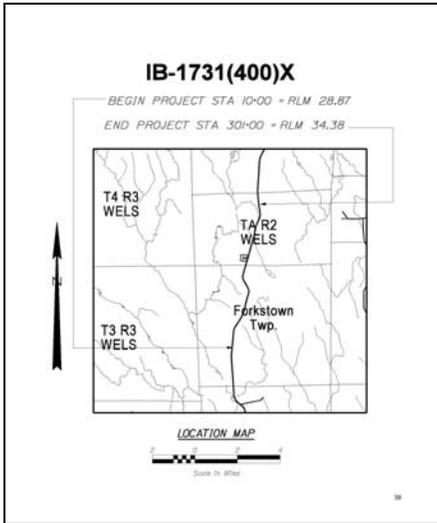
Location descriptions of the sections are as follows:

Forkstown Twp., Route 2A: Beginning 2.09 miles north of the Haynesville/Forkstown Twp town line, extending northerly 5.50mi to 1.32 mi south of the TA R2 WELS / Linneus town line. Travel-way only.

New Portland, Route 27: Beginning 0.15 of a mile northerly of the intersection of the River Road and extending northerly 5.51 miles to 0.04 of a mile northerly of High Street. Travel-way only.

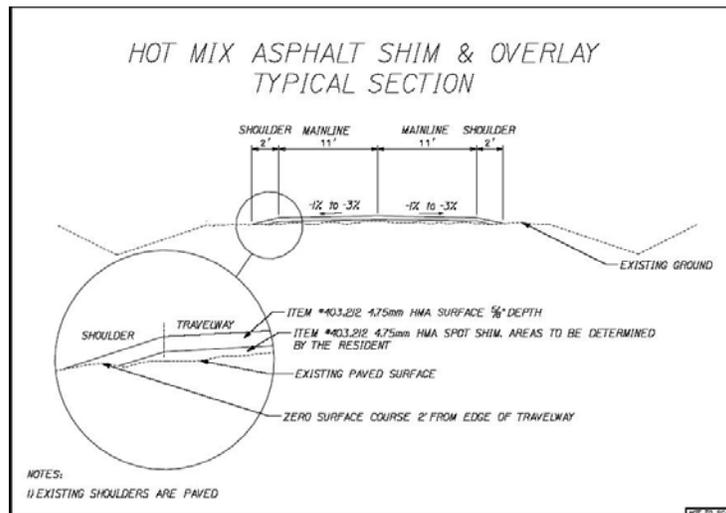
Caswell, Route 1A: Beginning at the intersection of Pond View St/ and rte. 1A, extending northerly 3.8 mi to 0.01 mi south of the intersection of Route 1A / Willard Crossing Rd. Travel-way only. The beginning and ending route log mile points are shown in the maps below which are taken from the contract bid books for the projects.

Project Begin & End Points



Typical Section

The typical cross-section is shown in the next Figure. The mainline lane width was 10 feet for some of the sections and 11 feet on the others.



Project Costs

Forkstown Twp.

The total quantities and unit costs for this project are shown in the following table.

Butt Joints	140 sq. yds.	\$25.00 per sq. yd.
Hot Mix Asphalt	3,580 tons	\$83.50 per ton
Bituminous Tack Coat	4,000 gal.	\$4.50 per gallon

Overall the project cost was around \$409,500 thousand, which totals \$74,463 per mile.

New Portland

The total quantities and unit costs for this project are shown in the following table.

Butt Joints	175 sq. yds.	\$14.50 per sq. yd.
Bituminous Tack Coat	2,325 gal.	\$3.57 per gallon
Hot Mix Asphalt 4.75 mm	3,200 tons	\$69.89 per ton

Overall the project cost was around \$278,250 thousand, which totals \$50,500 per mile.

Limestone

The Limestone section included some milling of existing pavement, some excavation, adding some subbase aggregate, and rehabilitation of shoulders. The quantities of some materials and unit costs for this project are shown in the following table.

Butt Joints	440 sq. yds.	\$15.00 per sq. yd.
HMA Shimming	4,880 tons	\$85.00 per ton
Hot Mix Asphalt 4.75 mm	2,460 tons	\$85.00 per ton
Bituminous Tack Coat	11,250 gal.	\$5.45 per gallon

Overall the project cost was around \$2.465 million, which totals \$650,437 per mile.

The table below shows the costs on all three projects, for the 4.75 mm HMA alone, without the associated project costs. The difference in per ton cost is likely due to geographic differences in the locations of the projects.

	Cost for HMA	Total Miles	Cost per Mile	Cost per Ton
Forkstown	\$298,930	5.50	\$54,351	\$83.50
New Portland	\$223,648	5.51	\$40,589	\$69.89
Limestone	\$209,100	3.79	\$55,172	\$85.00

Photos

Forkstown Twp.

Before & After Photos



The photo at right shows an area having the deepest rutting (RLM 8.112, See Charts on page 11)



New Portland

Before and After



The above photo shows one of the areas with the deepest rutting. (RLM 18.80, See Charts on page 12).



New Portland: Inspection Photos Prior to Paving





Limestone Photos

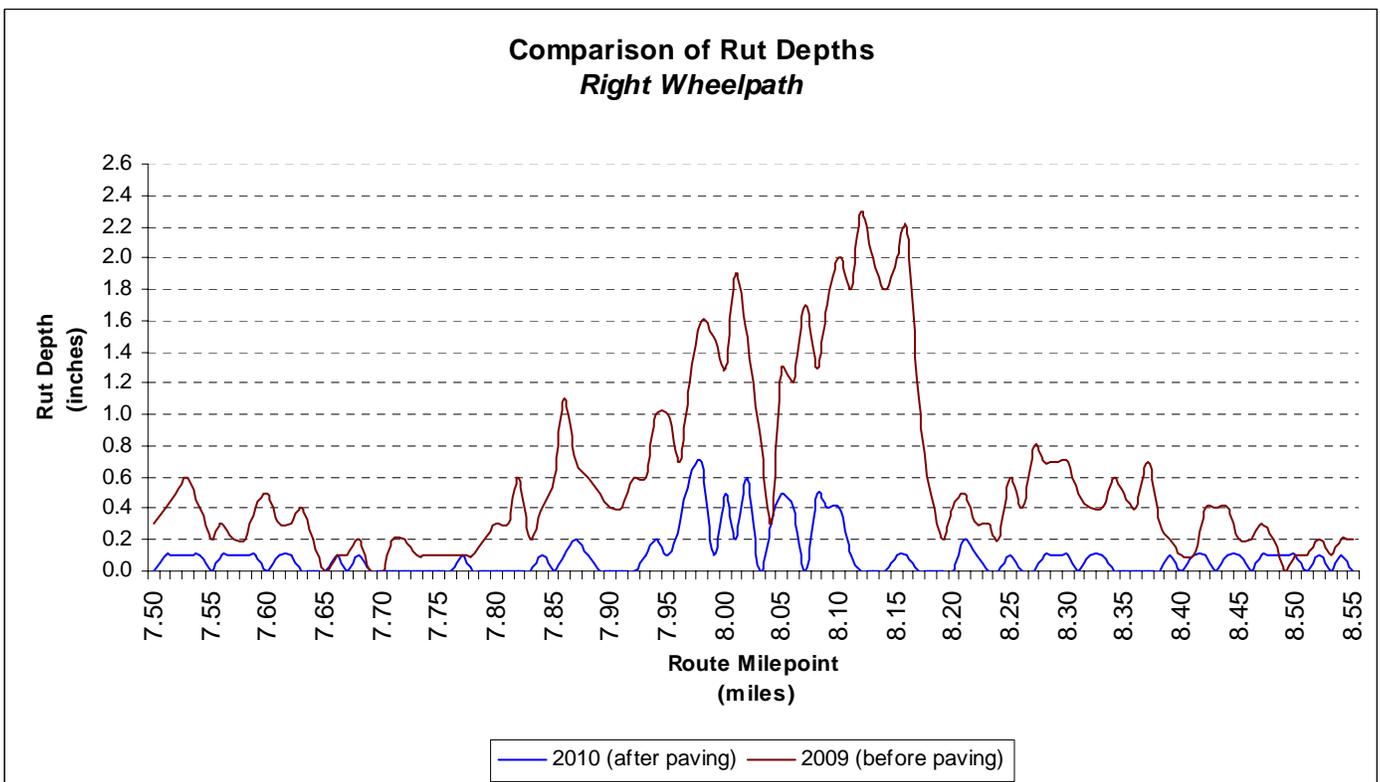
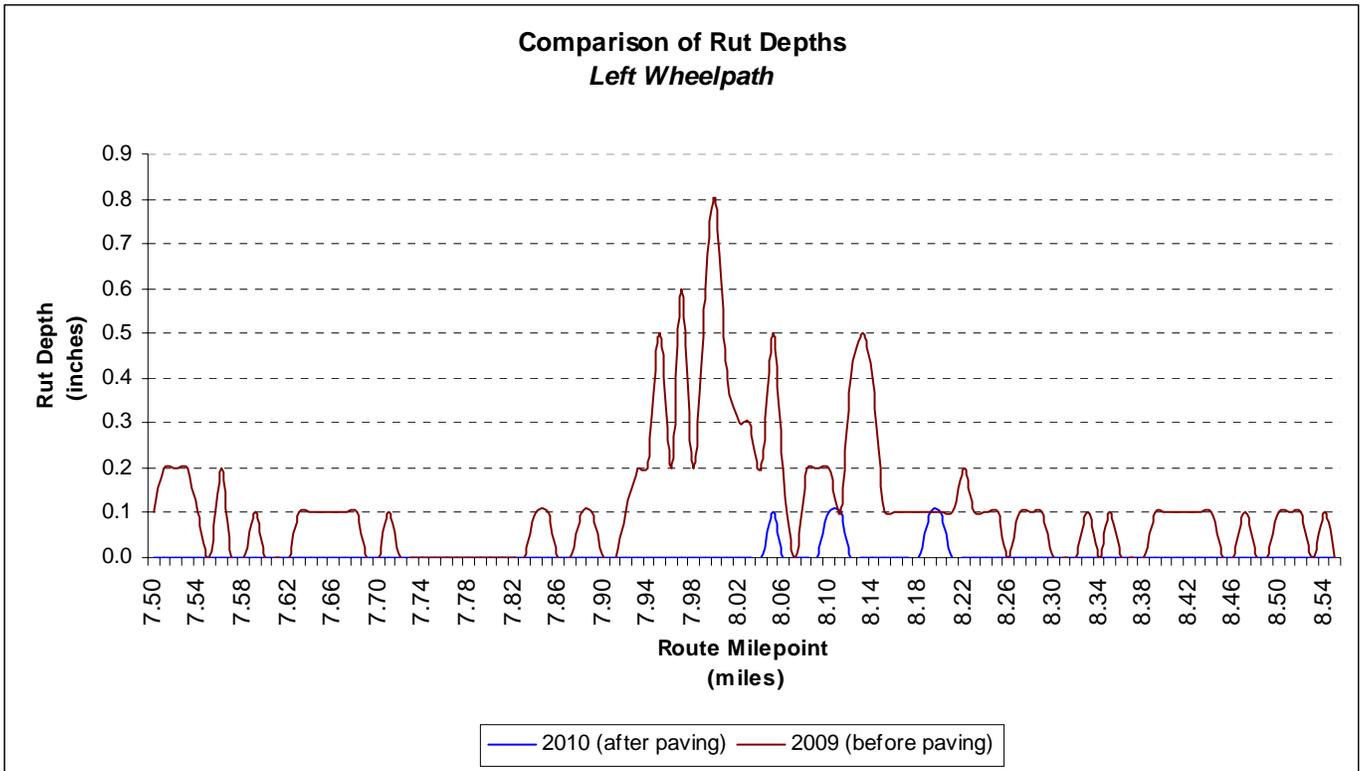
Before & After Photos



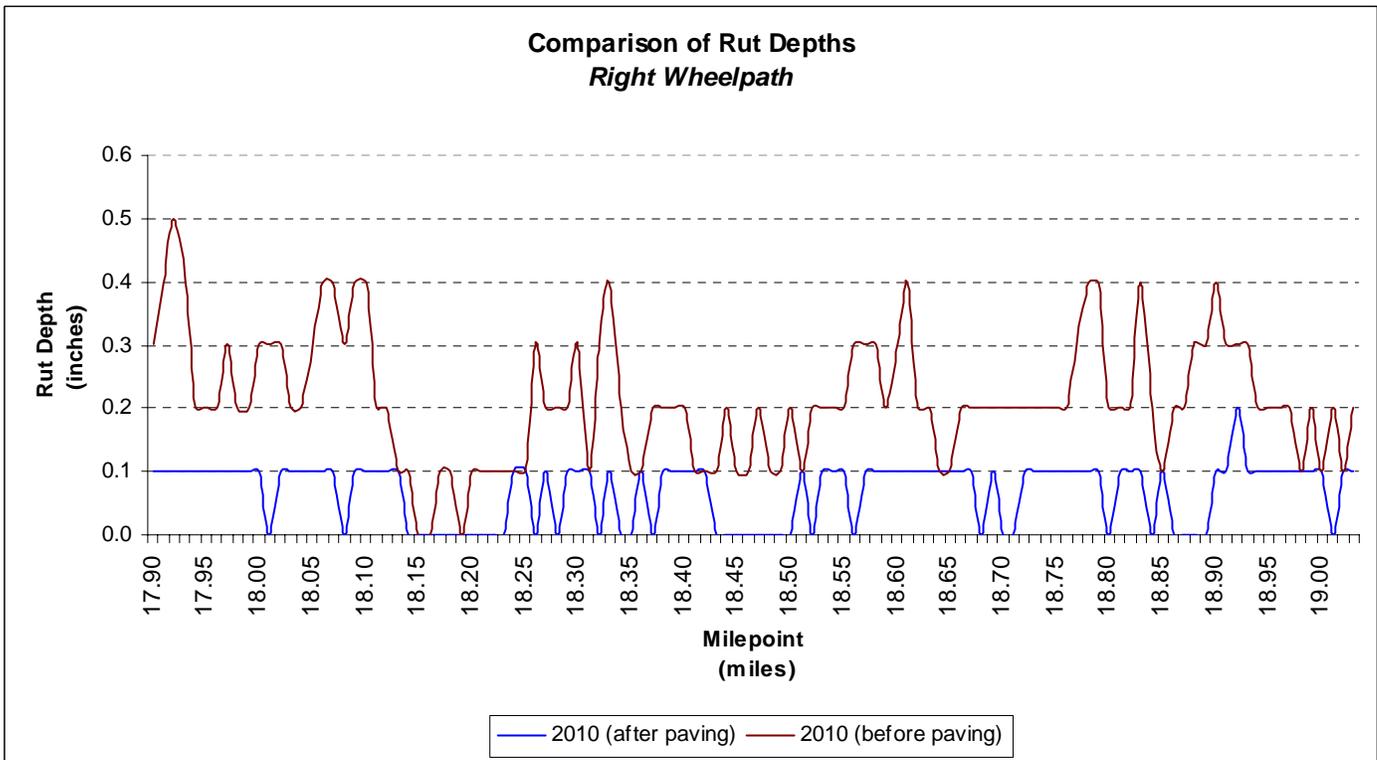
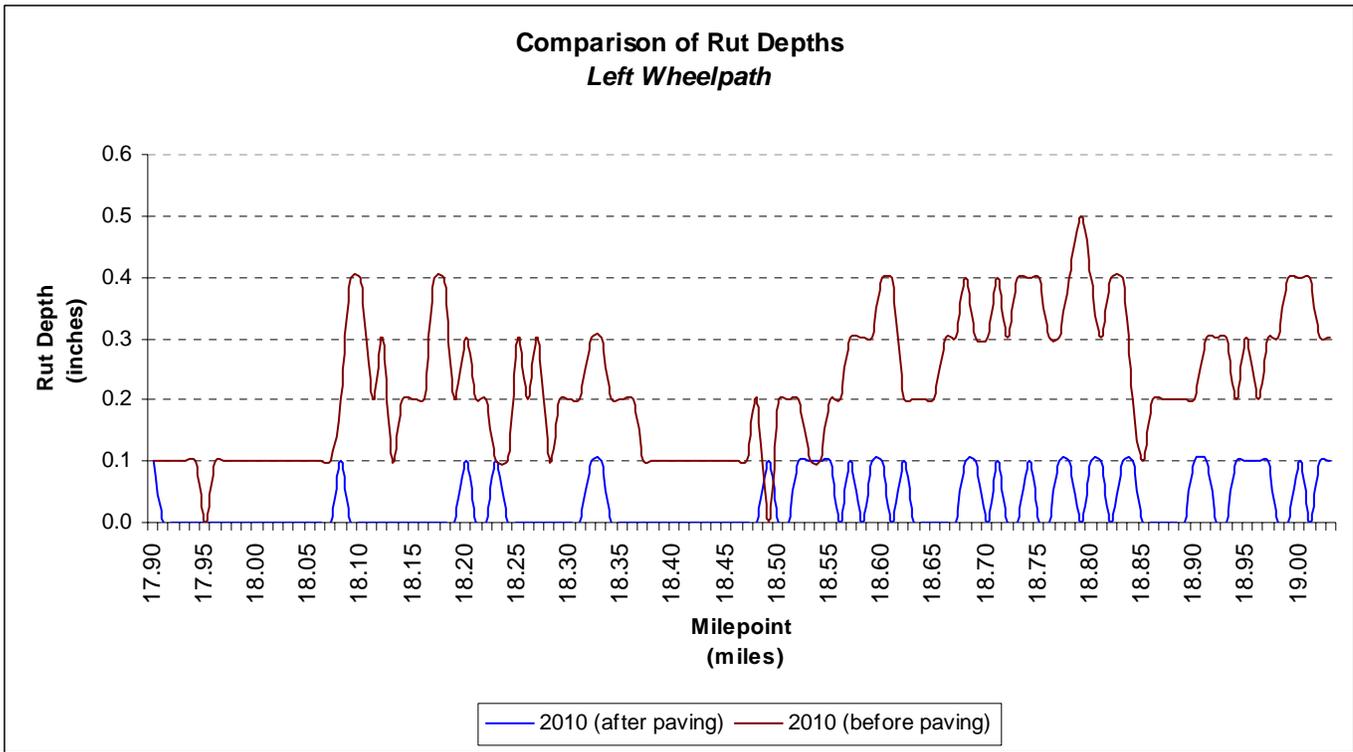
Rut Depths

Forkstown Twp. Data

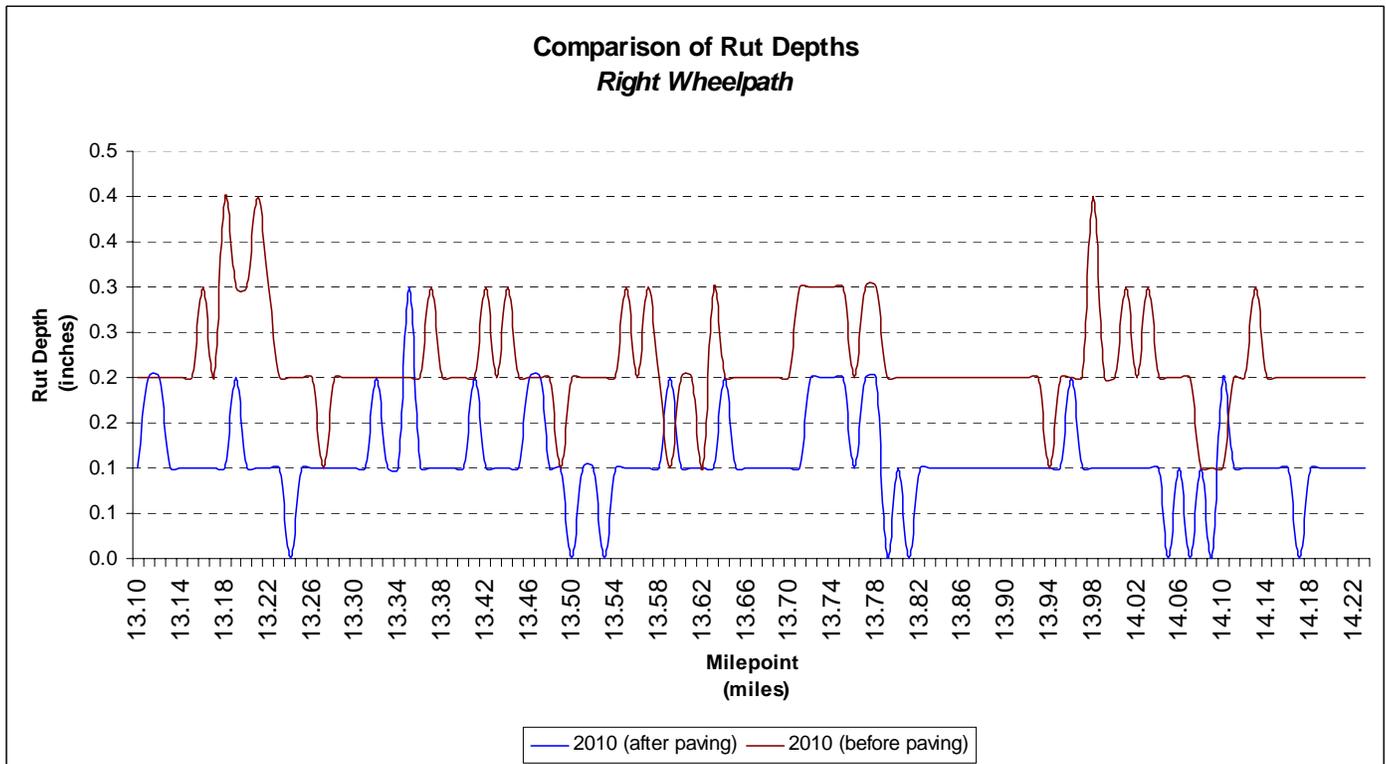
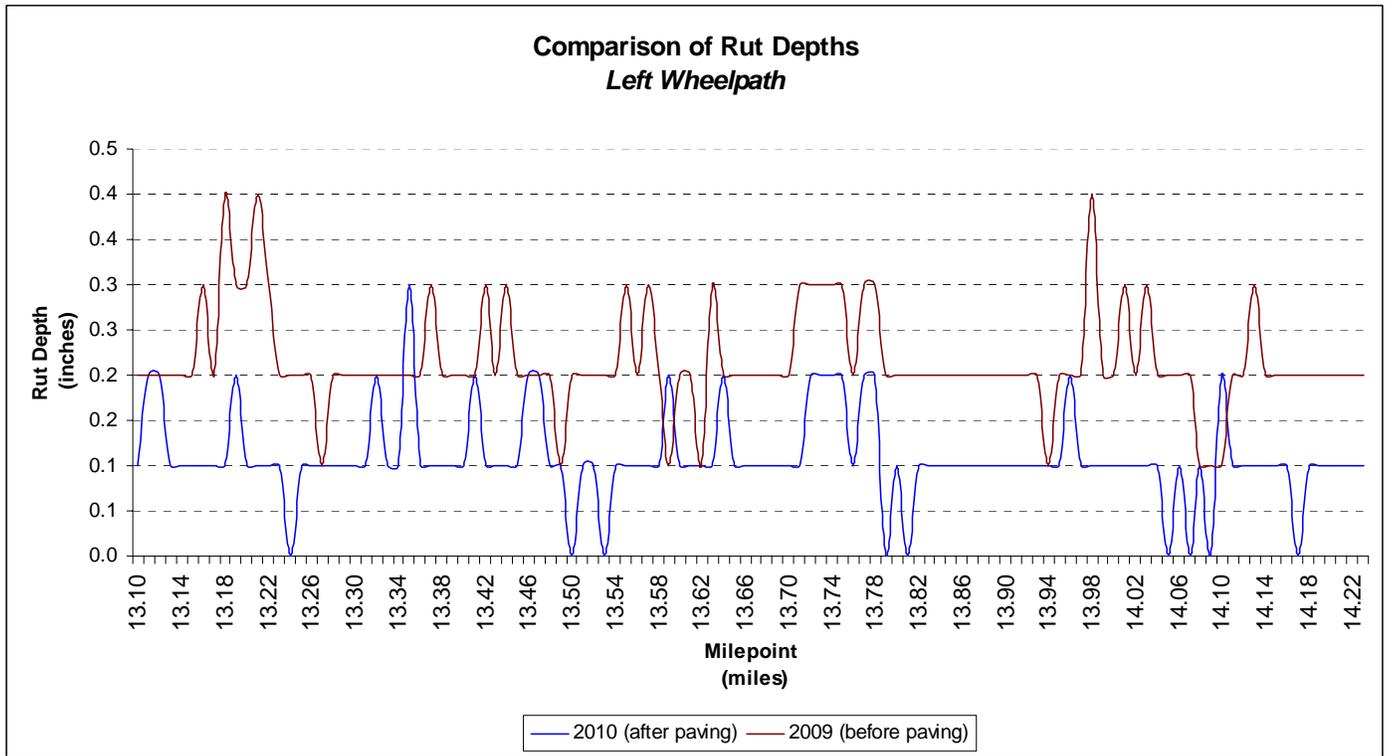
Rut depths were analyzed using the Department's Automatic Road Analyzer (ARAN). The measured rut depths may provide some indications on areas for future inspection. The charts below show one of these areas to be checked for additional evidence of pavement distress.



New Portland Data



Limestone Data



Conclusions/Recommendations

These trial applications were typical overlay projects without significant problems. Placement was uneventful. One concern raised on the projects was whether this treatment will last, or will reflective cracking become a problem. Some areas had extensive cracking, rutting, and bumps. In some of these areas the contractor had to fill in some holes by hand and then pave over them. The pavement applications was very thin and proceeded quickly. In the future these sites will be routinely reviewed for evidence of pavement distress and cracking. Follow up inspections will be done periodically and a final report will be completed after any significant findings.

Prepared by:

Bill Thompson
Transportation Planning Specialist
Maine Department of Transportation
16 State House Station
Augusta, Maine 04433-0016
Tel. 207-624-3277
e-mail: william.thompson@maine.gov

Reviewed By:

Dale Peabody
Transportation Research Engineer
Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016
Tel. 207-624-3305
e-mail: dale.peabody@maine.gov

Appendix A

SPECIAL PROVISION

SECTION 403

HOT MIX ASPHALT OVERLAY

Desc. of Course	Grad. Design	Item #	Bit Cont. % of Mix	Total Thick	No. of Layers	Comp. Notes
<u>5/8" HMA Overlay Areas</u>						
<u>Mainline Travelway, Shoulders as directed</u>						
Wearing	4.75mm	403.212	N/A	5/8"	1	1,4, 9, 20
<u>Shim, as directed</u>						
Shim	4.75mm	403.212	N/A	variable	1/more	1,2, 4, 9, 20
Spot Shims	12.5mm	403.212	N/A	variable	1/more	1,2,4,9,12,20

COMPLEMENTARY NOTES

1. The required PGAB for this mixture will meet a **PG 58-28** or **PG 64-28** grading. The Contractor must stipulate which PGAB grading will be used to construct the entire HMA pavement structure prior to starting work. Changes to the PGAB grading must be approved by the Department prior to the change in PGAB grading.
2. The density requirements are waived.
4. The design traffic level for mix placed shall be 0.3 to <3 million ESALS. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at 50 gyrations.
9. Section 106.6 Acceptance, (2) Method C. The Contractor may request a contract modification to change to testing method "A" prior to work starting on this item.
12. A mixture meeting the gradation of 12.5 mm hot mix asphalt may be used for this item as directed by the Resident.
20. The Contractor may place the specified HMA pavement course, not to exceed 1¼ inch (30mm) compacted depth, over the full single travel lane width, for each production day. If this option is utilized the Contractor will be required to place a matching course of HMA over the adjacent section of travel lane before the end of the following calendar day. The Contractor will also be responsible for installing additional warning signage that clearly defines the centerline elevation differential hazard, as well as additional centerline delineation such as double RPM application, or temporary painted line. The Traffic Control Plan shall be amended to include this option and the additional requirements. All signs and traffic control devices will conform to Section 719.01, and Section 652, and will be installed prior to the work, at a maximum spacing of 0.50 mile [0.80 km] for the entire length of the effected roadway section. On roadways with two-way traffic, the Contractor will be required to place the specified course over the full width of the mainline traveled way being paved prior to opening the sections to weekend or holiday traffic. If this option is utilized, all additional signing, labor, traffic control devices, or incidentals will not be paid for directly, but will be considered incidental to the appropriate 403 items.

Tack Coat

A tack coat of emulsified asphalt, RS-1, Item 409.15 shall be applied to any existing pavement at a rate of approximately 0.025 gal/yd², and on milled pavement approximately 0.05 gal/yd² prior to placing a new course. A fog coat of emulsified asphalt shall be applied between shim /base courses and the surface course, at a rate not to exceed 0.025 gal/yd². Tack used between layers of pavement will be paid for at the contract unit price for Item 409.15
Bituminous Tack Coat.